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L8: Entry 5 of 23

File: JPAB

Oct 25, 1994

PUB-NO: JP406296649A

DOCUMENT-IDENTIFIER: JP 06296649 A

TITLE: LIFTING APPARATUS FOR TAKING HANDICAPPED PERSONS TO BATHTUB

PUBN-DATE: October 25, 1994

INVENTOR-INFORMATION:

NAME

COUNTRY

SCHMIDT, PETER

ASSIGNEE-INFORMATION:

NAME

COUNTRY

SCHMIDT & LENHARDT GMBH & CO OHG

APPL-NO: JP06062064

APPL-DATE: March 7, 1994

INT-CL (IPC): A61G 7/10

ABSTRACT:

PURPOSE: To further simplify the structure of a lifting apparatus for taking handicapped persons to bathtub, to make the apparatus more stable and to shorten the distance from the floor to the lift platform when the platform is at the lowest position.

CONSTITUTION: A U-shaped outer frame 18 and a rectangular inner frame 14 form the guide framework for the lift platform 24 of a lifting apparatus. The two frames 14, 18 are each made integrally of grass-fiber-reinforced plastics and have sliding articulations 20, which are molded on integrally and are guided by runners. The sliding articulations 20 are formed on hook-like extensions 38 of the longitudinal shanks 28, 32 of the frames 14, 18, and when the lift platform 24 is in its lowered position, the sliding articulations 20 are substantially below the outlines of the outer frame 18 and above the outlines of the inner frame 14.

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L14: Entry 20 of 31

File: DWPI

Sep 5, 1996

DERWENT-ACC-NO: 1996-403095

DERWENT-WEEK: 199641

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TITLE: Lightweight portable lifting frame for mobile medical applications - has tubular construction, hand or electrically winched hoisting jib for patient chair and castor=borne trolley base

INVENTOR: WEINER, R

PATENT-ASSIGNEE: WEINER R (WEINI)

PRIORITY-DATA: 1995DE-1007608 (March 4, 1995)

 Search Selected **Search All** **Clear**

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
<input type="checkbox"/> DE 19507608 A1	September 5, 1996		008	A61G007/10

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
DE 19507608A1	March 4, 1995	1995DE-1007608	

INT-CL (IPC): A61 G 7/10; B66 E 9/06; B66 E 9/075

ABSTRACTED-PUB-NO: DE 19507608A

BASIC-ABSTRACT:

A lightweight portable lifting frame for use in the mobile medical services has a collapsible construction comprising an H-shaped trolley base (1) with roller castors (2) at each corner supporting a robust central column (6,7).

The column (6,7) is formed from two lengths of square section hollow tube which slot together axially to form a continuous run securely anchored (4,5) to the base (1) at its lower end.

An angled hoisting jib (10,15) carrying a crossbeam (not shown) at its extremity (16) for patient chair support travels the length of the column (6,7) on upper (12) and lower (12.1) roller assemblies under the control of a hand or electric non-overhauling winch (19.1) to a pulley (9) and tractive cable.

USE/ADVANTAGE - Is of simple readily assembled/dismantled construction suitable for transport by motorvehicle and can also be easily carried by hand.

ABSTRACTED-PUB-NO: DE 19507608A

EQUIVALENT-ABSTRACTS:



US006203233B1

(12) United States Patent
Stanley(10) Patent No.: US 6,203,233 B1
(45) Date of Patent: Mar. 20, 2001

(54) EXPANSION JOINT FOR THERMOPLASTIC RAIL SYSTEMS

(75) Inventor: Larry S. Stanley, Pine Beach, NJ (US)

(73) Assignee: Avcon Technologies, LLC, Toms River, NJ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/307,447

(22) Filed: May 10, 1999

(51) Int. Cl.⁷ F16B 7/18

(52) U.S. Cl. 403/28; 403/260; 256/65

(58) Field of Search 256/59, 65, 66, 256/68, 69, 19, 1; 403/28, 206, 208, 210

(56) References Cited

U.S. PATENT DOCUMENTS

1,840,048 *	1/1932	Michelman	256/65 X
2,242,427 *	5/1941	Heanue	256/65
2,930,638 *	3/1960	Morrissey	256/65 X
2,999,671 *	9/1961	Blayden	256/65

4,150,907 *	4/1979	Thurnauer	256/67 X
5,303,900 *	4/1994	Zulick, III et al.	256/65
5,370,368 *	12/1994	Terrels et al.	256/19
5,437,433 *	8/1995	Rezek	256/67
5,547,169 *	8/1996	Russell	256/67
5,566,926 *	10/1996	Voigt	256/65 X
5,785,447 *	7/1998	Fonti et al.	256/65 X

* cited by examiner

Primary Examiner—Harry C. Kim

(74) Attorney, Agent, or Firm—Clifford G. Frayne

(57)

ABSTRACT

An expansion joint for connection of intersecting members of a plastic railing system, the expansion joint having a tubular collar having a male structural member positioned therein and secured to one intersecting tubular member, the second intersecting tubular member slidably receivable within the tubular collar and about the male structural member, the tubular collar having one end having a coped surface for cooperable mating with the exterior surface of the first intersecting tubular member so as to provide a structurally secure connection between the intersecting tubular members yet allow for the thermal expansion and contraction of one intersecting tubular member.

4 Claims, 6 Drawing Sheets

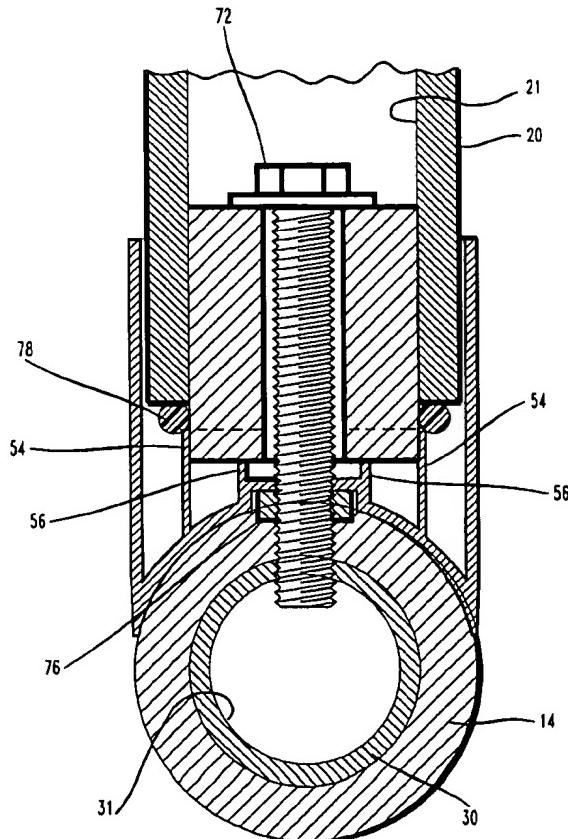


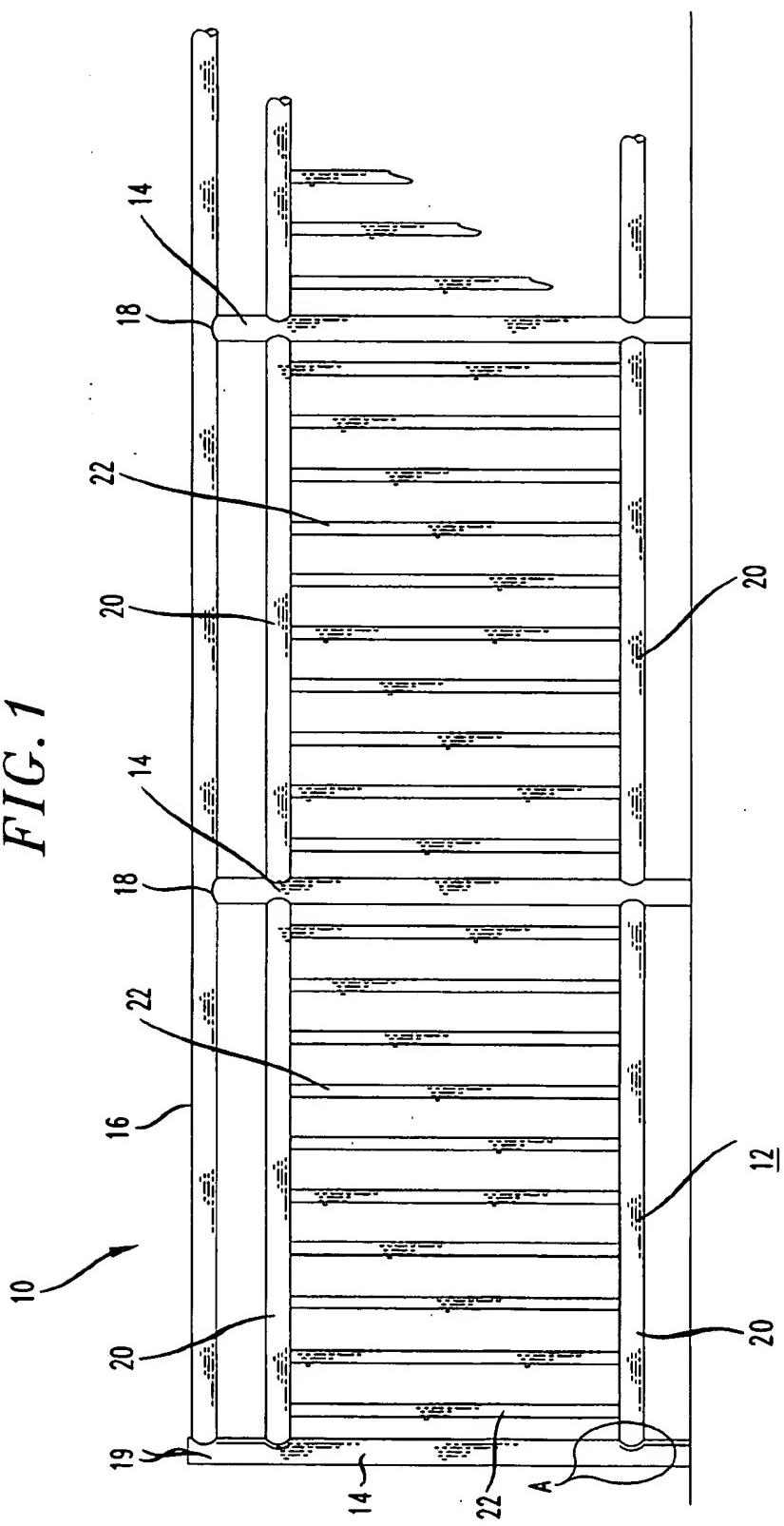
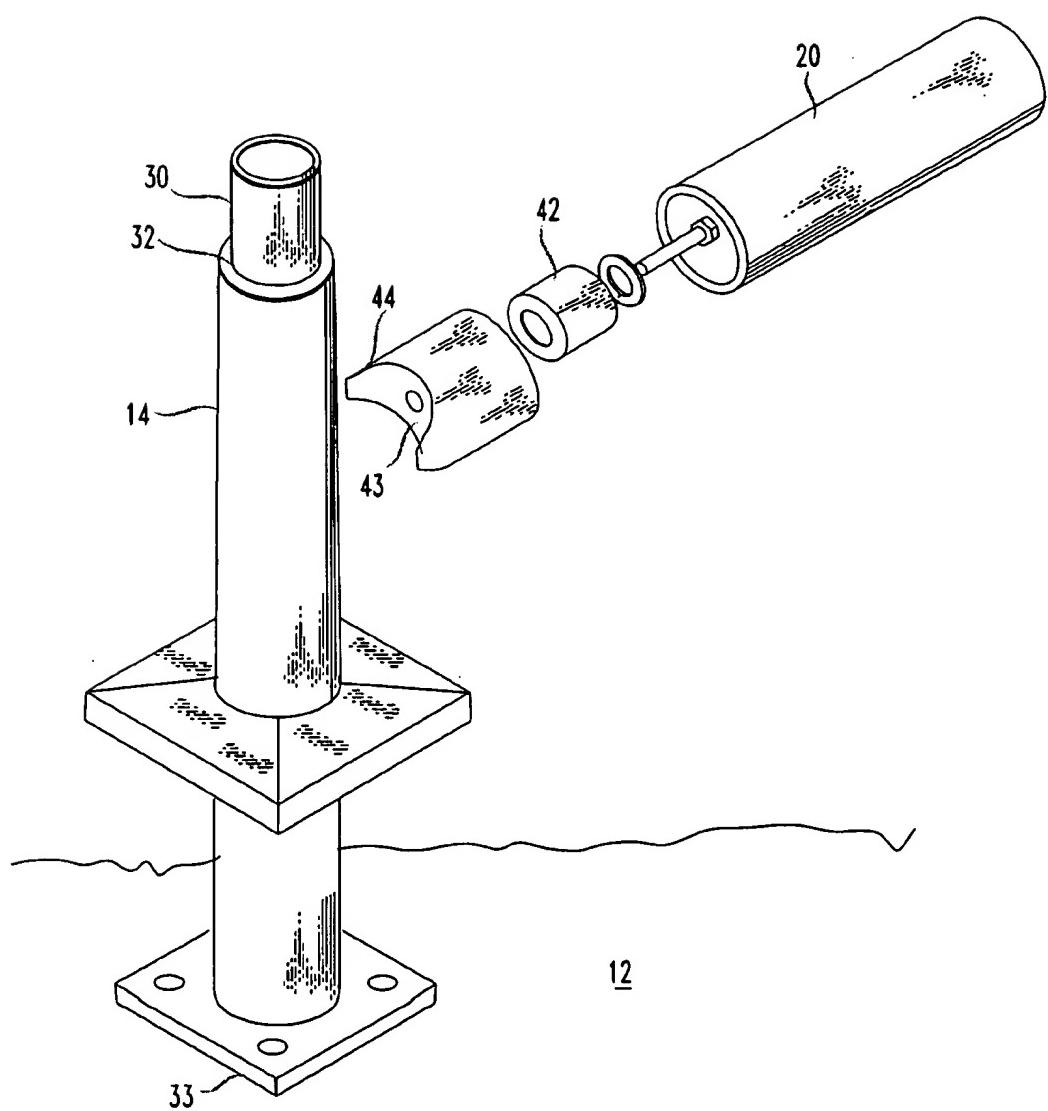
FIG. 1

FIG. 2



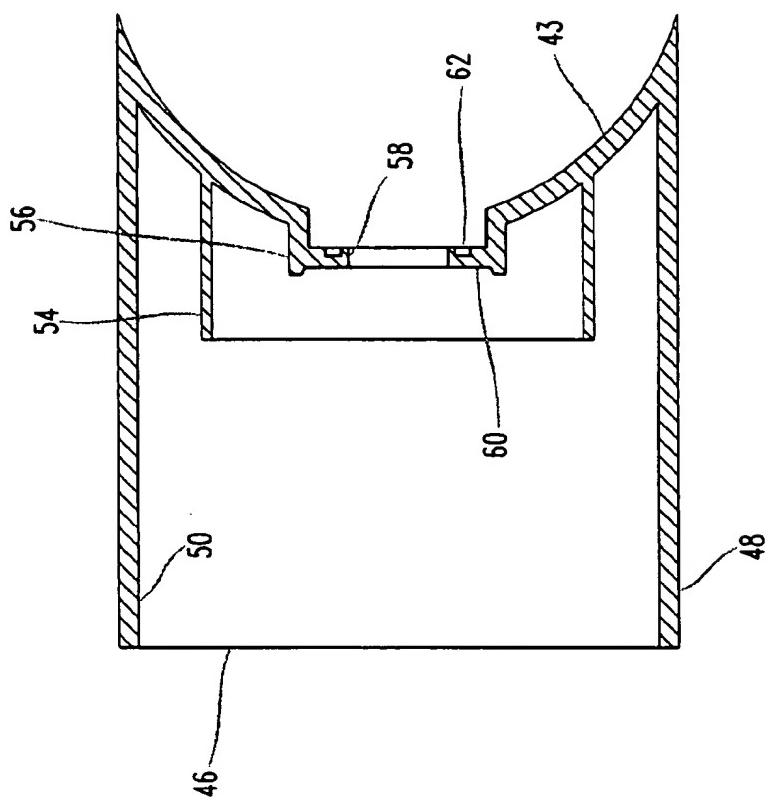


FIG. 4

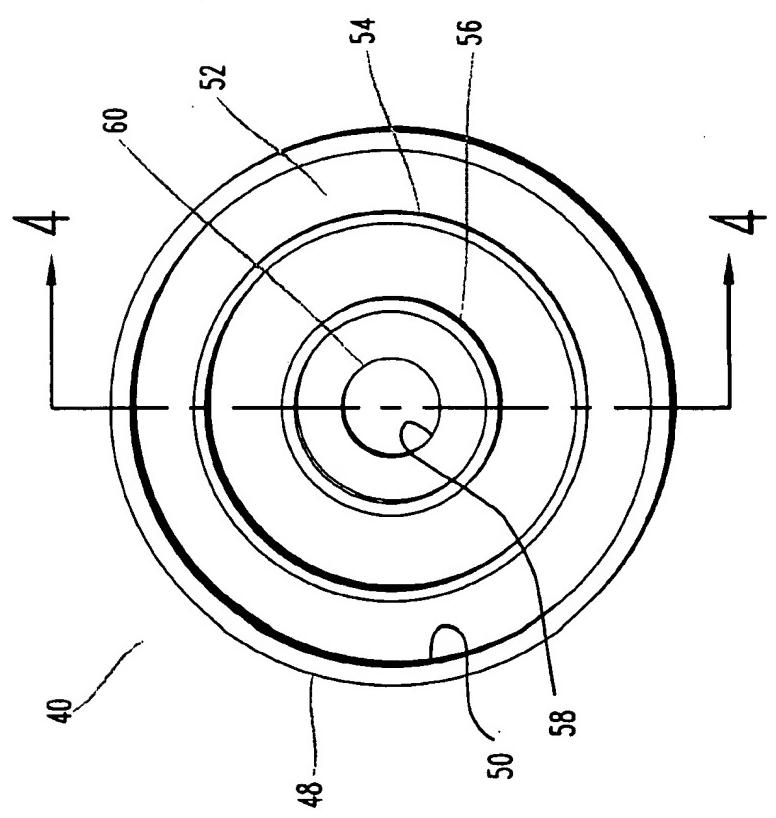


FIG. 3

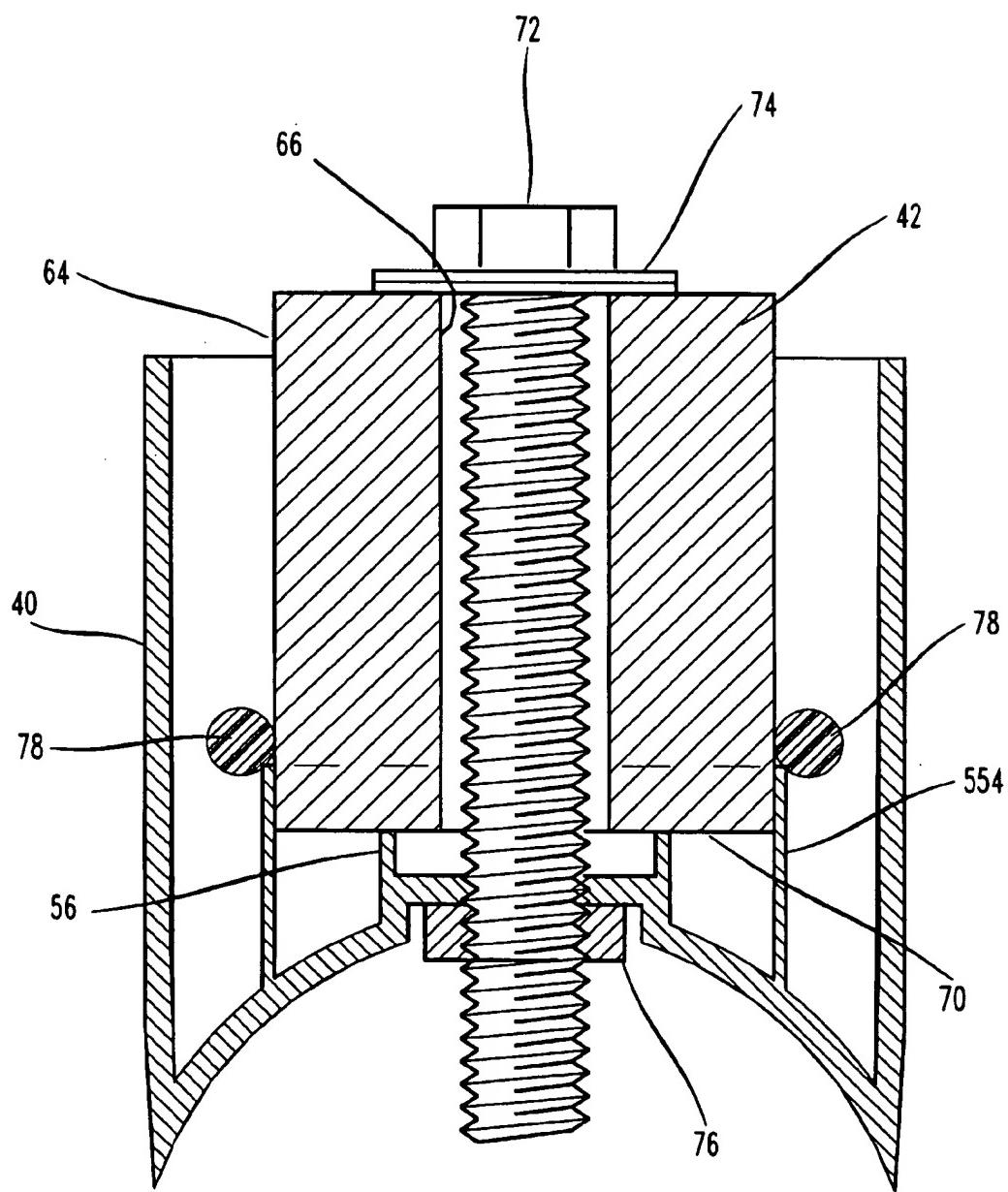
FIG. 5

FIG. 6

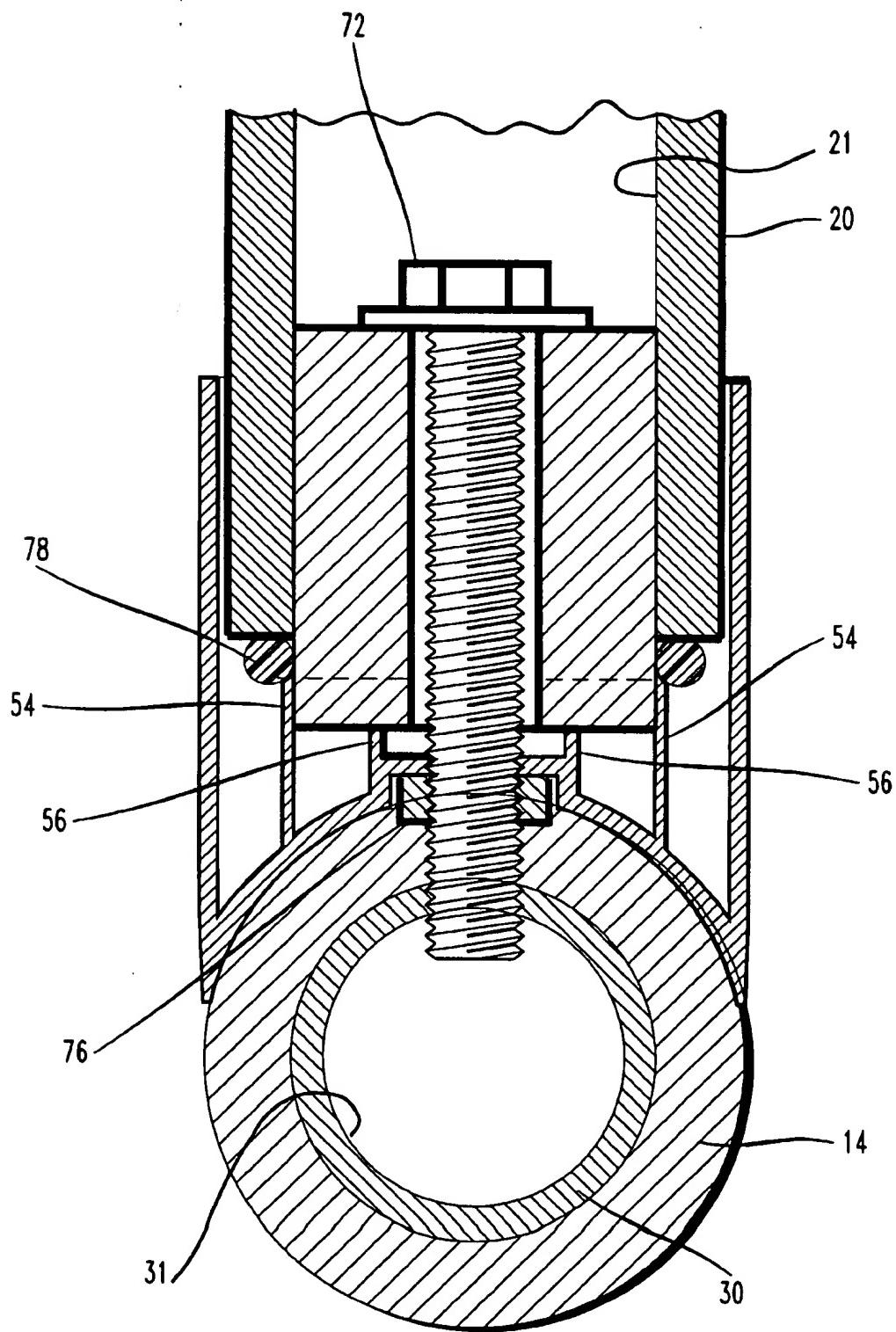
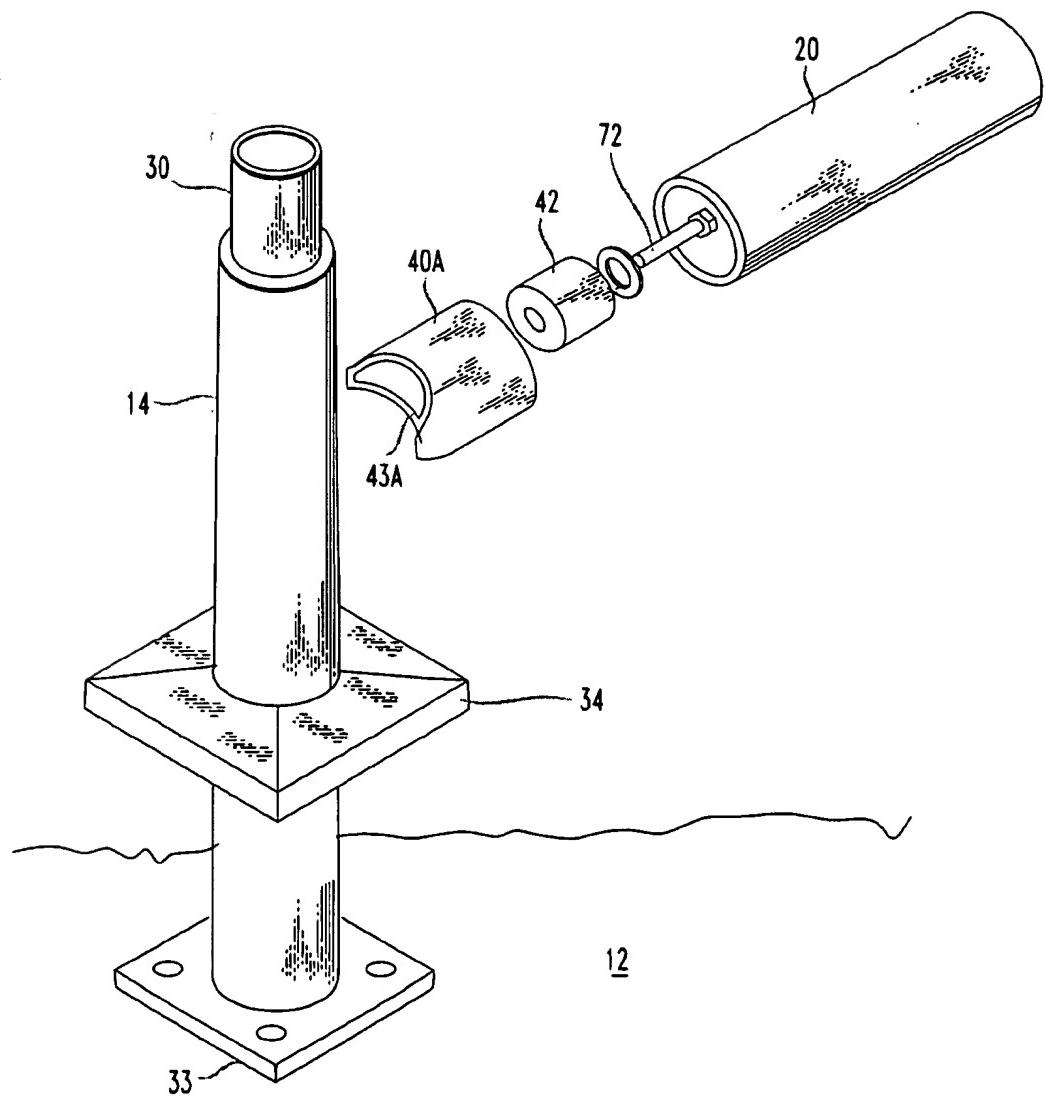


FIG. 7

1

EXPANSION JOINT FOR THERMOPLASTIC RAIL SYSTEMS**BACKGROUND OF THE INVENTION****1. Field of the Invention**

The present invention relates to thermoplastic rail systems, and more particularly to an expansion joint for use with such thermoplastic rail systems.

2. Description of the Prior Art

Railings serve the purpose of guard rails, hand rails, grab rails and in many instances serve as area dividers. Railings have long been used for a variety of applications, such as multi-story buildings with stairways, balconies, patios, industrial buildings, playgrounds and schools, among any number of other wide variety of uses. These uses are both indoors and outdoors. Outdoor railing systems are exposed to the weather and other corrosive elements such as salt water, chemical vapors and the like. In addition, outdoor railings are subjected to temperature differentials and in some instances depending upon the location, extreme temperature differentials.

Building codes require the use of high strength material such as iron, steel, aluminum and the like to provide the sufficient rigidity and strength to insure adequate safety and security qualities depending upon the location and purpose of the railing system. Thermoplastic railing systems have become popular due to certain intrinsic qualities of the thermoplastic as set forth hereinafter. In order to meet building codes, thermoplastic railing systems typically include a plurality of vertical posts which are mounted or secured to a base or decking member. These vertical posts typically have a tubular steel reinforcing member which is positioned within a tubular thermoplastic pipe formed from materials such as acrylonitrile styrene acrylate (ASA), PVC, acrylic or the like, in order to meet the necessary rigidity and strength requirements.

These vertical posts interconnect with one or more horizontal rails which in turn may have vertical balusters extending therebetween. Usually at least one of the horizontal rails and in most instances, the top most rail of the railing system also includes a tubular steel insert within the thermoplastic tubular member, this tubular steel insert being aligned and secured to vertical posts having a tubular steel reinforcing member. The tubular steel insert in the rail may or may not run continuously throughout. The intermediate vertical balusters and horizontal rails which do not have structural metal inserts are commonly referred to in the trade as in-fill area posts and rails.

While thermoplastic rail systems solve many of the problems experienced by metal railings due to weather and corrosive elements, one of the problems with thermoplastic rail systems which has not been adequately solved is the manner in which it accommodates thermal expansion and contraction of the horizontal rails or balusters. Thermal expansion and contraction solutions in the past, while meeting the strength and rigidity requirements, have failed in the aesthetic requirements in that thermal contraction resulted in a visible gap between the mating members of the horizontal rails and vertical posts or horizontal rails and balusters.

The present invention provides for an expansion joint which meets or exceeds the strength and rigidity requirements and solves the aesthetic problems experienced by thermal expansion and contraction.

OBJECTS OF THE INVENTION

An object of the present invention is to provide for an improved thermoplastic rail system providing an aestheti-

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cally pleasing appearance while maintaining the requisite strength and rigidity required by building codes.

Another object of the present invention is to provide an improved thermoplastic rail system which adapts to thermal expansion and thermal contraction without affecting the strength and rigidity required by building codes.

A still further object of the present invention is to provide for an improved thermoplastic rail system having thermal expansion and thermal contraction joints which are resistant to moisture migration.

A still further object of the present invention is to provide for an improved expansion joint for thermoplastic rail systems.

A still further object of the present invention is to provide for an improved expansion joint for thermoplastic rail systems which is aesthetically pleasing and shields such thermal expansion or contraction from visibility.

SUMMARY OF THE INVENTION

A thermoplastic rail system having expansion joints for the accommodation of thermal contraction and thermal expansion which meet the requisite strength and rigidity requirements of building codes and are aesthetically pleasing in that they shield such thermal expansion or thermal contraction from visibility.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the present invention will become evident particularly when taken in light of the following illustrations wherein:

FIG. 1 is a front elevational view of a typical reinforced plastic hand rail security system.

FIG. 2 is a perspective of the expansion joint.

FIG. 3 is an end view of the expansion collar.

FIG. 4 is a cross section view along plane 4—4 of FIG. 3.

FIG. 5 is the cross section view of FIG. 4 including an engagement means.

FIG. 6 is the cross section view of FIG. 5 including the rail member.

FIG. 7 is a perspective view of an alternative embodiment of the expansion joint.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a thermoplastic rail system 10 to which the present invention has application. The rail system 10 is installed on a support surface 12 which can be a wood or concrete deck or any other home, commercial or industrial site where railings are used. Only two particular railing sections are shown in FIG. 1, it being appreciated that any number of sections can be joined together in a repeated fashion, depending upon the size of the area where the rail system is to be installed and the length of the railing system desired.

The rail units and the posts are made of tubular thermoplastic pipe. It is contemplated that the pipe/tubing may be suitably reinforced with fibers and the like in accordance with well known state of the art techniques wherein additional strength and/or rigidity is required. Further, the pipes may have a smooth, gloss, satin or matte finish and may be made in a variety of colors by adding pigment to the extrusion material.

Typically, the size of thermoplastic pipe found suitable for the present invention would have an outside diameter of

approximately two inches and have a wall thickness of at least one quarter of an inch, although smaller and larger size tubing may be used with the present invention. In addition, while the rail system disclosed as well as the invention herein are illustrated with tubular pipe having a circular cross section, the tubular pipe may also have one of many other geometric cross sections (i.e. square, triangular, hexagon, etc.).

The thermoplastic material is impervious to corrosive elements such as salt, spray, rain, snow, as well as corrosive chemical atmospheres. Further, the pipe is resistant to denting, scratching and other physical abuse.

The thermoplastic rail system comprises load bearing posts 14 which are mounted to or in the support surface 12. A railing member 16 normally spans the railing system 10 proximate the upper terminus 18 of load bearing posts 14 and a plurality of rails 20 and balusters 22 are code required so as to prevent bodily ingress or egress through the thermoplastic rail.

In order to provide extra security and rigidity, particularly when the railing system 10 is used on elevated balconies or elevated walkways or elevated patios or decks, the load bearing posts 14 and upper rail member 16 each have structural metal inserts for additional rigidity and reinforcement, these inserts being mechanically secured at the intersection of the upper rail 16 and the load bearing posts 14. Load bearing post 14 would normally have a tubular metal member inserted throughout its entire length. Rail member 16 will have a tubular metal insert at least at the intersection with a vertical post.

The problem which has been encountered and the problem which applicant has solved is the thermal expansion and contraction of the rails where they meet or mate with posts 14 and also the balusters extending between rails. The thermoplastic rail system must accommodate thermal expansion and contraction with respect to these rails and balusters without compromising the strength and safety of the railing system or detracting from the aesthetic appearance.

FIG. 2 is a partial exploded perspective view of area A of FIG. 1 which illustrates applicant's expansion joint to accommodate thermal expansion and contraction. A vertical load bearing thermoplastic post 14 of tubular construction has a structural metal insert 30 positioned within tubular throughbore 32. This vertical load bearing post member 14 would be secured to support surface 12 by any suitable means and may be maintained in position by a flange plate assembly 33 which may or may not have a decorative cover member 34 also constructed of a similar thermoplastic.

Rail 20 is mated at one end to vertical load bearing post 14 and to a similar vertical load bearing post 14 (not shown) at its opposite end or other vertical support structure. Rail 20 is constructed of thermoplastic and is of a tubular configuration. In order to mate rail 20 with vertical load bearing post 14, an expansion collar 40 and internally mounted male structural member 42 are utilized. The invention is illustrated with respect to thermoplastic tubular members of circular cross section but has equal application to tubular member of varying shaped cross sections as well as both the post and rails have the same cross section.

As will be more fully described hereafter, expansion collar 40 is tubular in cross section having a first end 44 which is coped 43 to a configuration that matches the outer surface of vertical post 14. The second end 46 of expansion collar 40 is open in cross section having an inner diameter cross section or configuration equal to the outer diameter or cross section or configuration of rail 20 and is for the receipt of male structural member 42.

FIG. 3 is a view of the interior of expansion collar 40 from second end 46. Expansion collar 40 is defined by an outer

wall 48, having an inner surface 50 the diameter of which is equal to the outer circumference of rail 20 or the outer geometric configuration of rail 20. Depending upwardly from the arcuate inner surface 52 of coped first end 44 is a first annular rib 54 concentric with outer wall 48. Within first annular rib 54 and in spaced apart relationship is a second upstanding annular rib 56 concentric with first annular rib 54 and outer wall 48. Centered within second annular rib 56 is an aperture 58 extending through coped end wall 44, aperture 58 being for receipt therethrough of a threaded mechanical fastener. The annular surface 60 between second annular rib 56 and the perimeter of aperture 58 is planar as further illustrated in FIG. 4 which is a cross section of expansion collar 40 along plane 4-4 of FIG. 3.

FIG. 4 illustrates a cross section of expansion collar 40 and the relationship between first end 44 and coped surface 43 and arcuate inner surface 52 along Plane 4-4 of FIG. 3. FIG. 4 also illustrates first annular rib 54 and its height relationship with respect to second annular rib 56. Also illustrated in greater detail is the planar annular surface 60 about aperture 58. Aperture 58 is for the receipt of a mechanical fastening means as which will be more fully discussed hereafter which would extend through aperture 58 and be secured to vertical post 14 and tubular metal insert 30. FIG. 4 illustrates the fact that on coped surface 43 of expansion collar 40, there is an annular recess about aperture 58 defining an annular surface 62. In the assembly stage, annular surface 62 is for the receipt of a resilient O-ring (not shown) so as to prevent the ingress of any moisture into vertical post 14 in order to protect steel insert 30.

Referring now to FIG. 5 there is illustrated a cross sectional view of expansion collar 40 with male structural member 42 and the mechanical fastener installed therein. Male structural member 42 is cylindrical in shape having an outer surface 64, the circumference of which is substantially identical to the inner circumference of first annular rib 54 such that male structural member 64 is frictionally engaged with the inner surface of first annular rib member 54 when male structural plug member 64 is inserted into expansion collar 40. Male structural member 42 also has a centrally disposed throughbore 66 which is aligned with aperture 58 when male structural member 42 is so frictionally engaged with annular rib member 54. The depth of insertion of male structural member 42 into expansion collar 40 is limited by second annular rib member 56 and the upper annular surface 68 thereof engaging first end 70 of male structural member 42 about throughbore 66.

In the embodiment a threaded mechanical fastener 72 with washer 74 is inserted through throughbore 66 and aperture 58 and would extend into the area defined by first end 44 and its coped surface 43. FIG. 5 also illustrates the placement of O-ring 76 on annular surface 62 such that it circumscribes the mechanical fastener 72. Additionally, a second resilient O-ring 78 is positioned on and circumscribes the male structural plug member 42 is positioned adjacent the upper annular surface of first upstanding annular rib 54.

FIG. 6 is a cross sectional view along Plane 6-6 of FIG. 1 illustrating the cooperation of expansion collar 40 with rail 20, male structural member 42 and load bearing post 14. The coped surface 43 of first end 44 of expansion collar 40 is mated to the outer surface of load bearing post 14 which has a tubular metal insert member 30 disposed therein. Load bearing post 14 and metal insert member 30 define a throughbore 31 and load bearing post 14 and metal insert member 30 are fabricated with a horizontal throughbore 33 which extends from the outer circumference of load bearing post 14 to communication with throughbore 31. Throughbore 33 is threaded so as to cooperate with threaded mechanical fastener means 72. In this construction, it can be

seen that expansion collar 40 is mated to load bearing post 14 by means of threaded mechanical fastener 72 and male structural member 60. In threading mechanical fastener 72 through threaded throughbore 33 in load bearing post 14 and metal insert 30 such that surface 44 is juxtaposed on the outer surface of load bearing post 14, O-ring 76 forms a water tight seal about mechanical fastener 72 and annular surface 62.

Rail 20 has a circumferential outer surface or cross section 80 equal to the inner circumferential surface or cross section 50 of expansion collar 40. Rail 20 defines a throughbore 21 having a circumferential cross section equal to the outer circumference 64 of male structural member 20. Rail 20 is inserted into expansion collar 40 until its circumferential end surface 82 engages O-ring 78 about the upper surface of first annular rib member 54. The outer circumferential side wall 80 and the inner circumferential wall 21 are therefore in frictionally engaged contact with the inner surface 50 of outer wall 48 of expansion collar 40 and the outer circumference 64 of male structural member 42 respectively.

The extension of male structural member 42 into throughbore 21 of rail 20 provides the necessary structural rigidity for rail 20 as required by code. A similar installation would occur at the opposite end of rail 20 in conjunction with a second load bearing post 14 utilizing the identical expansion collar 40, male structural member 42 and installation procedure. Similar procedures would be repeated depending upon the number of rails extending between vertical load bearing posts 14.

In this configuration, under thermal expansion, the rail 20 is free to expand against O-ring 78 which can deform to allow for such expansion. Further, under this installation procedure, rail 20 is free to thermally contract, but such contraction still maintains the end of rail 20 within the expansion collar 40 such that an individual observing the rail system would not notice any aesthetically displeasing separation as a result of thermal contraction. Still further, male structural member 42 extends a sufficient distance into the throughbore 21 of rail 20 such that the safety and rigidity of the railing system is not compromised by such thermal contraction.

The structural integrity of the railing system is maintained by the vertical posts having the metal or steel tubular liner and the elongate top rail which has a metal insert where it is affixed to the vertical posts. The intermediate rails and balusters require structural integrity, particularly if the railing system is positioned on an elevated surface such as a balcony. The rigidity for the elongate intermediate rails is provided by the male structural member 42 being securely fastened to the vertical post and extending into the throughbore 21 of the rail 20. In the configuration disclosed thus far, the male structural member 42 and collar 40 are both secured to vertical post 14 by the same fastening means 72.

In an alternative embodiment illustrated in FIG. 7, male structural member 42 may be secured directly to the vertical post 20 utilizing fastening means 72. The throughbore 21 of rail 20 would then slide over male structural member 42 such that the end of rail 20 was proximate vertical post 14. A collar 40A having an interior diameter equal to the exterior diameter of rail 20 could be slipped over rail 20 and be secured to vertical post 14 and thus aesthetically cover the intersection of rail 20 with vertical post 14. In this embodiment, collar 40A is tubular in construction having a cross sectional configuration identical to rail 20. In this configuration, however, tubular collar 40A would not have a coped surface as disclosed in the first embodiment, but

rather, would have a coped annular wall 43A which would be configured to match the exterior surface of vertical post 14.

In this configuration rail 20 is secured to a vertical post 14 in accordance with safety and code requirements and the gap between rail 20 and vertical post 14 is blocked or masked by tubular collar 40A which may be secured to vertical post 14 by means of an adhesive applied to the annular coped wall 43A. Both embodiments provide the structural integrity required for the railing system, but provide alternate methods of masking the intersection of rail system members yet allowing for thermal contraction and expansion.

While the present invention has been disclosed with respect to the exemplary embodiments thereof, it will be recognized by those of ordinary skill in the art that many modifications may be made without departing from the spirit and scope of the invention. Therefore it is manifestly intended that the invention be limited only by the scope of the claims and the equivalence thereof.

I claim:

- 20 1. An expansion joint for connection of intersecting members of a thermoplastic railing system comprising:
a first intersecting tubular member having a throughbore;
a second intersecting tubular member having a throughbore;
- 25 a tubular collar having a first end and a second end, said first end having a coped surface cooperable for mating with the exterior surface of said first intersecting tubular member, said coped surface having a centrally disposed aperture therein, said second end of said tubular collar having an open cross sectional configuration for a frictional slidable receipt of one end of said second intersecting tubular member;
- 30 a male structural member having a cross section complimentary with said throughbore of said second tubular member for slidable frictional engagement therein, said male structural member engaged within said tubular collar, said male structural member having a centrally disposed throughbore alignable with said aperture in said first end coped surface of said tubular collar wherein said tubular collar has an interior concentric wall with an inner circumference which is complimentary with an outer circumference configuration of said male structural member, said interior concentric wall for the frictional engagement and positioning of said male structural member within said tubular collar and alignment of said throughbore of said male structural member with said aperture in said coped surface of said tubular collar; and
- 35 a fastening means extending through said throughbore of said male structural member and said aperture of said coped surface of said first end of said tubular collar and secured into said first tubular intersecting member.
- 40 2. The expansion joint in accordance with claim 1 wherein a recess is formed on said coped surface about said aperture in said coped surface for receipt of a water type O-ring gasket.
- 45 3. The expansion joint in accordance with claim 1 wherein a resilient O-ring gasket is disposed about said male structural member.
- 50 4. The expansion joint in accordance with claim 1 wherein said fastening means comprises a threaded fastener threadedly securable into said first intersecting tubular member.

* * * * *

United States Patent [19]

McGee

[11] 4,314,576
[45] Feb. 9, 1982

[54] UNIVERSAL SELF HELP AID APPARATUS FOR INVALIDS

[76] Inventor: Charles W. McGee, 445 Thoma St., Reno, Nev. 89502

[21] Appl. No.: 110,818

[22] Filed: Jan. 10, 1980

[51] Int. Cl.³ F16M 13/08; A61H 3/04

[52] U.S. Cl. 135/67; 297/6

[58] Field of Search 135/67; 272/70.3, 70.4, 272/70; 297/5, 6; 5/81; 280/289

[56] References Cited

U.S. PATENT DOCUMENTS

9,215	8/1852	Hopkins	5/81 R
503,105	8/1893	Tingley	5/81 R
1,394,224	10/1921	Scott	135/67
2,759,525	8/1956	Ries	135/67
3,085,258	4/1963	Wolfert	135/67
3,249,368	5/1966	Ginzburg	297/6
3,272,530	9/1966	Klassen	297/5
3,405,954	10/1968	Wolfe	297/5

4,111,445 9/1978 Haibeck 297/5

OTHER PUBLICATIONS

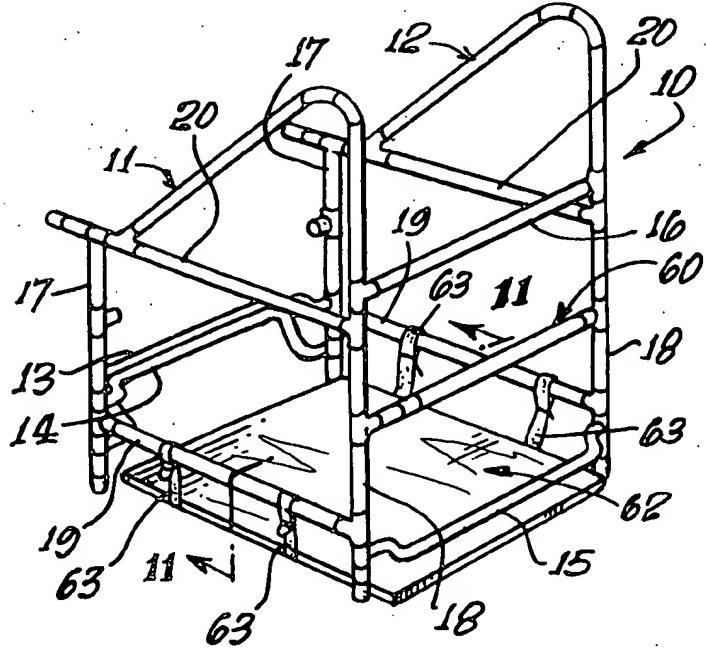
R. H. Nyquist M.D., American Journal of Physical Medicine, vol. 41, No. 4, pp. 152-154 Aug. 1962.

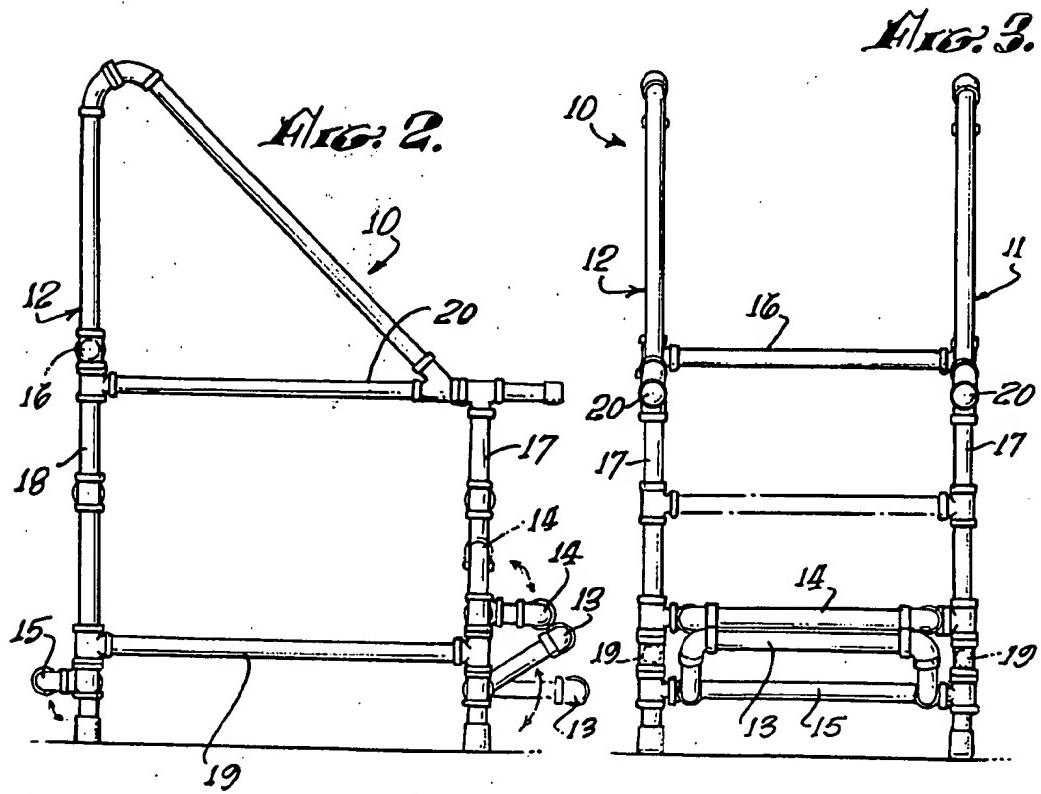
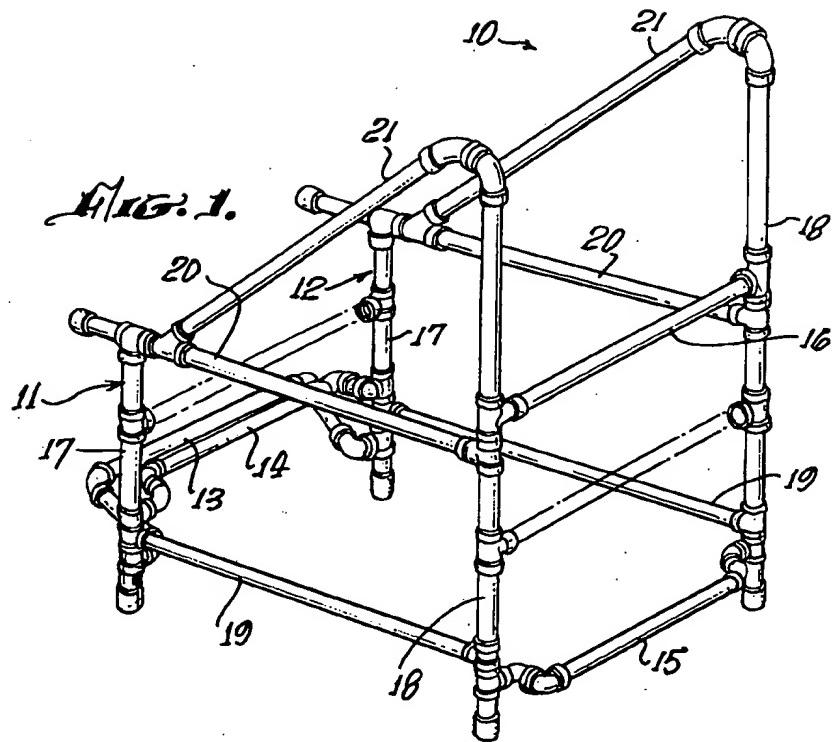
Primary Examiner—Reinaldo P. Machado
Attorney, Agent, or Firm—Herbert C. Schulze

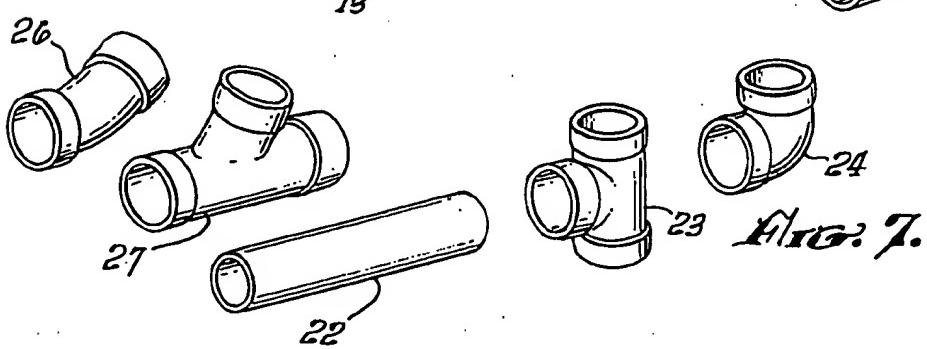
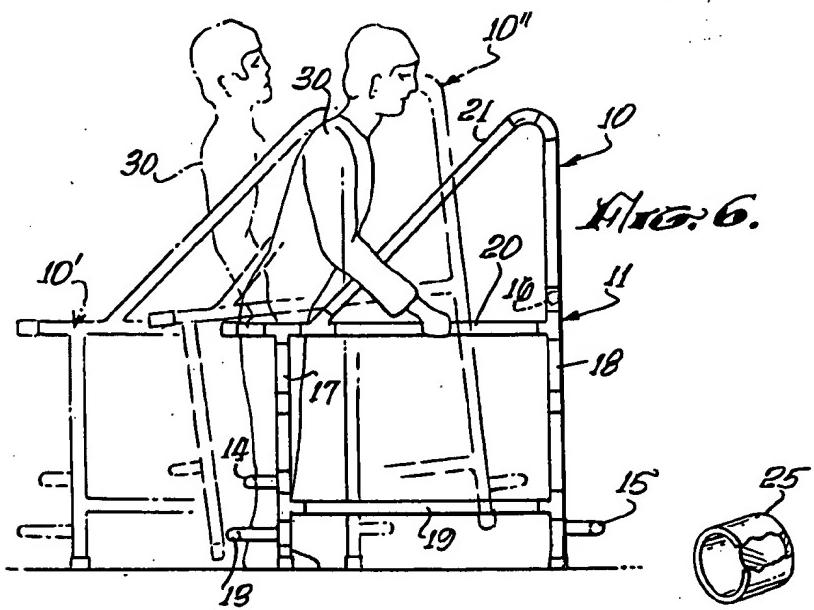
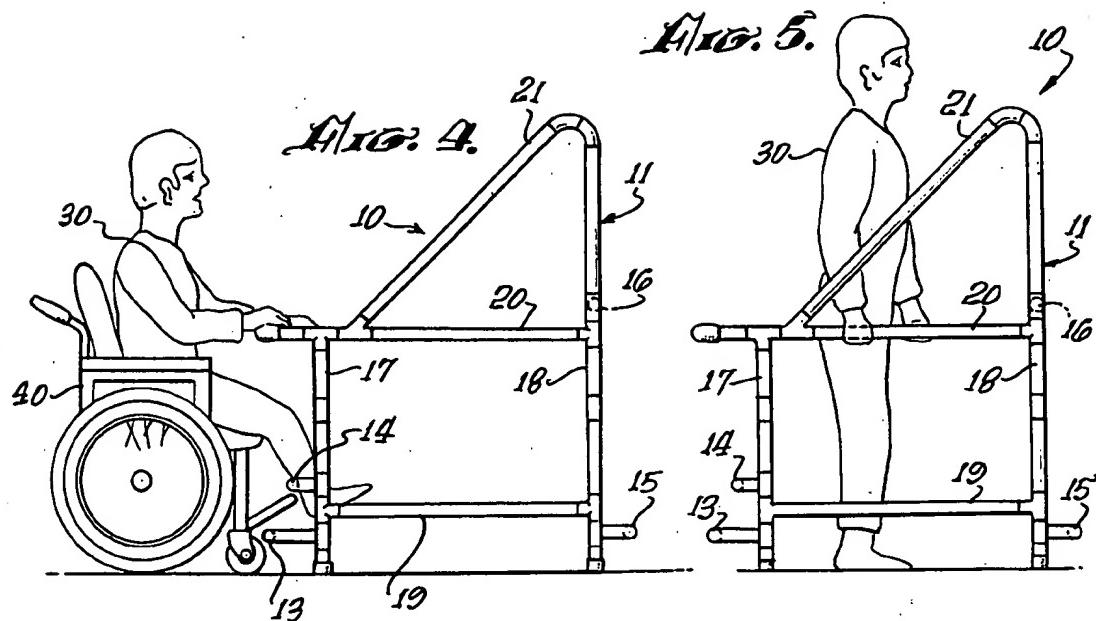
[57] ABSTRACT

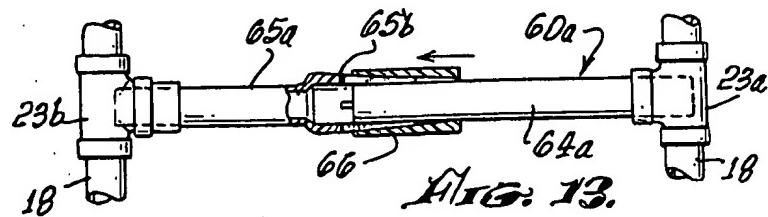
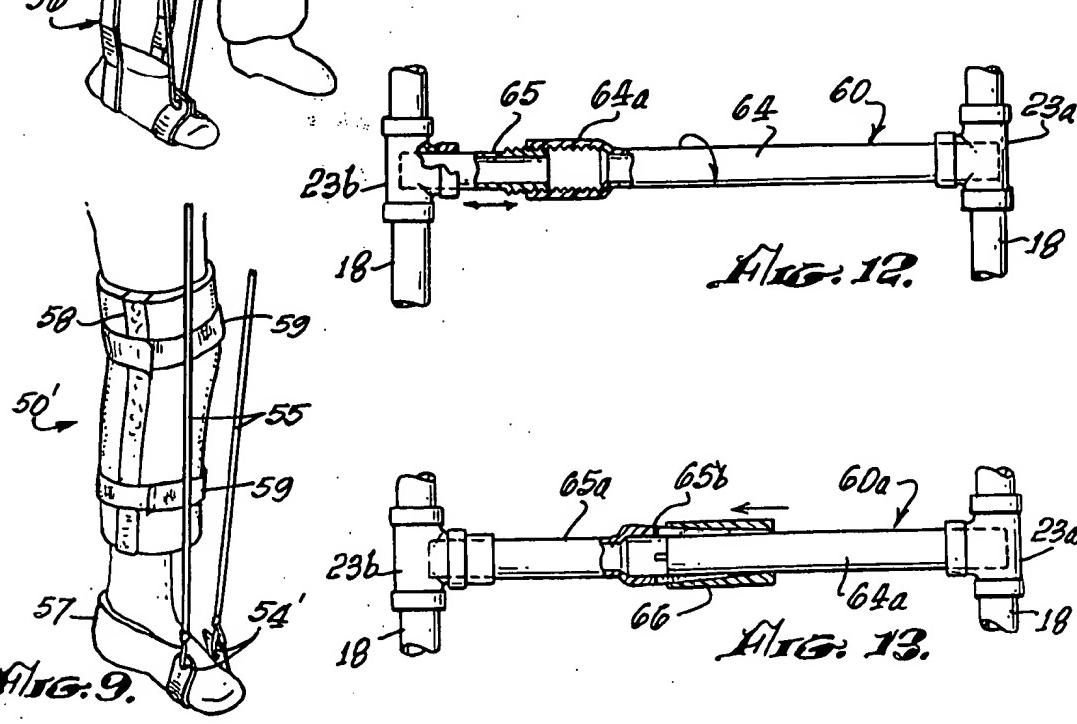
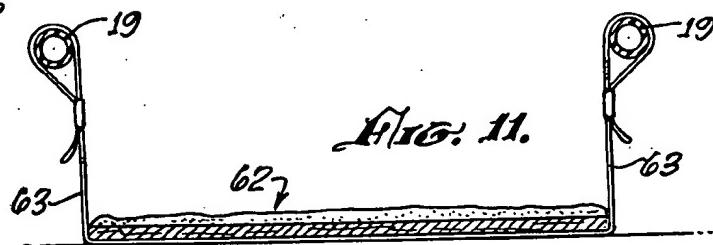
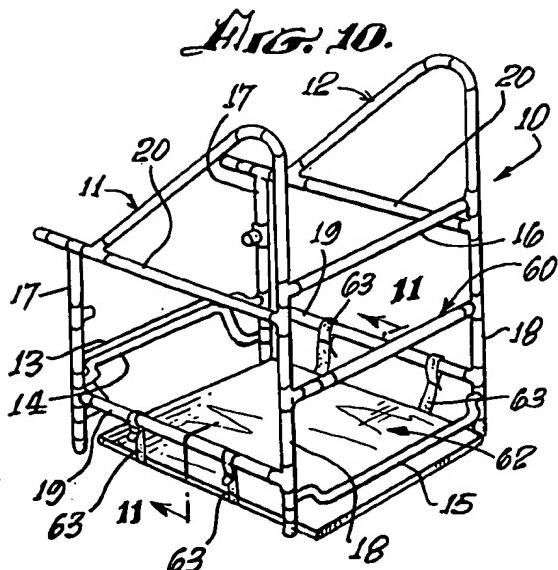
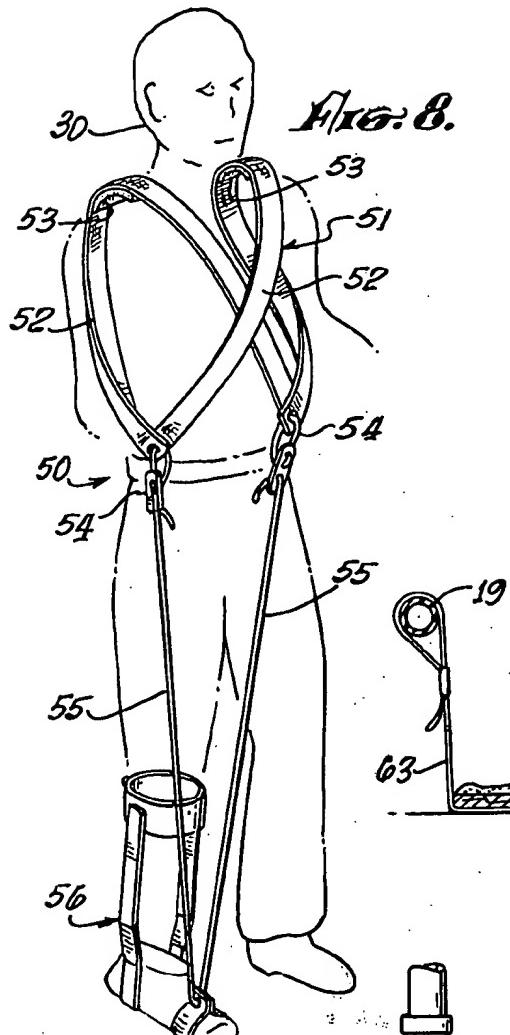
This is an apparatus which has universal application for invalids who have lost much of the functioning of their limbs and other portions of their bodies such as paraplegics and the like. The apparatus is characterized by being composed of a number of tubular elements formed into a frame and having attachments of such nature that a person in a wheel chair may approach the frame and pull himself into position within the frame and with the use of various attachments about his legs and other portions of his body is able to stand, to walk and to exercise without the assistance of other persons.

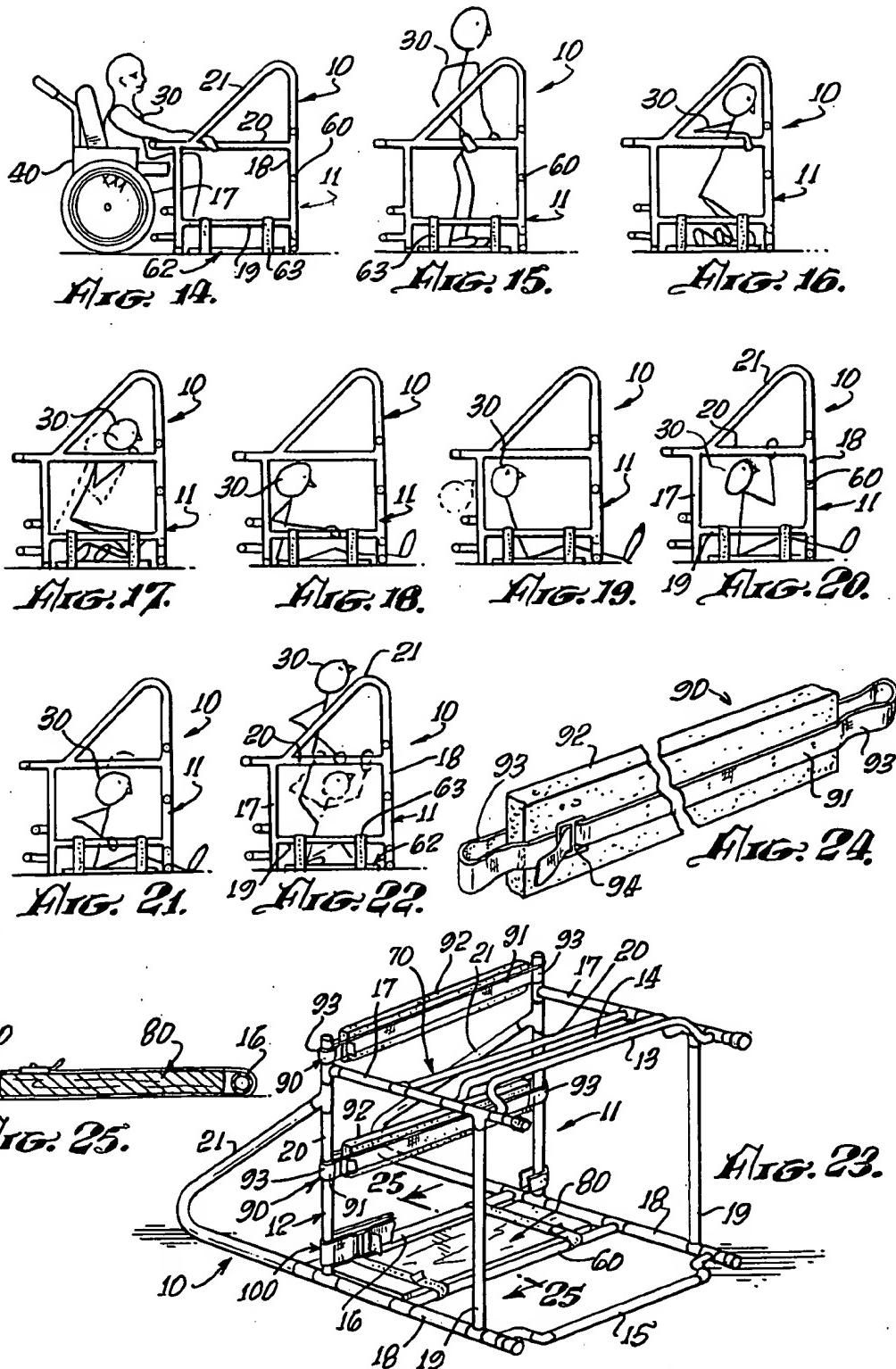
8 Claims, 30 Drawing Figures

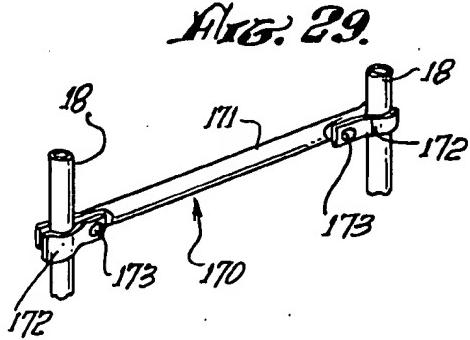
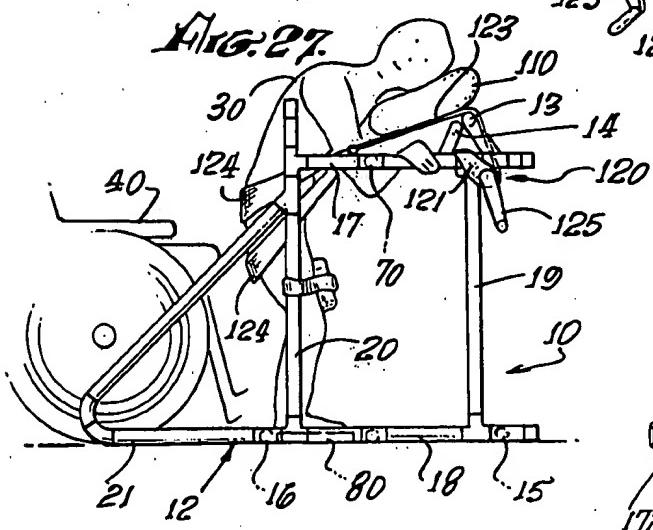
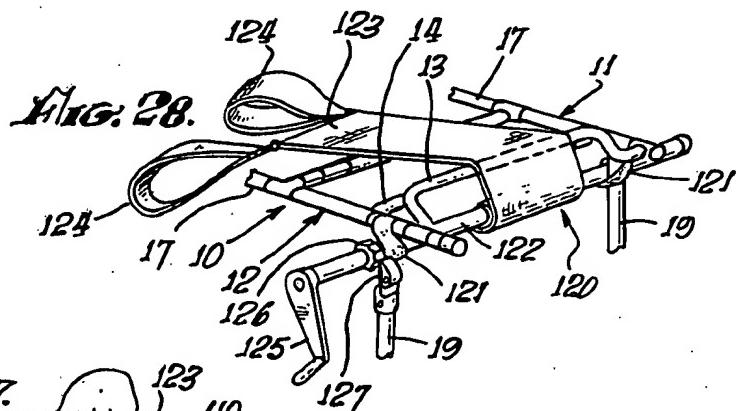
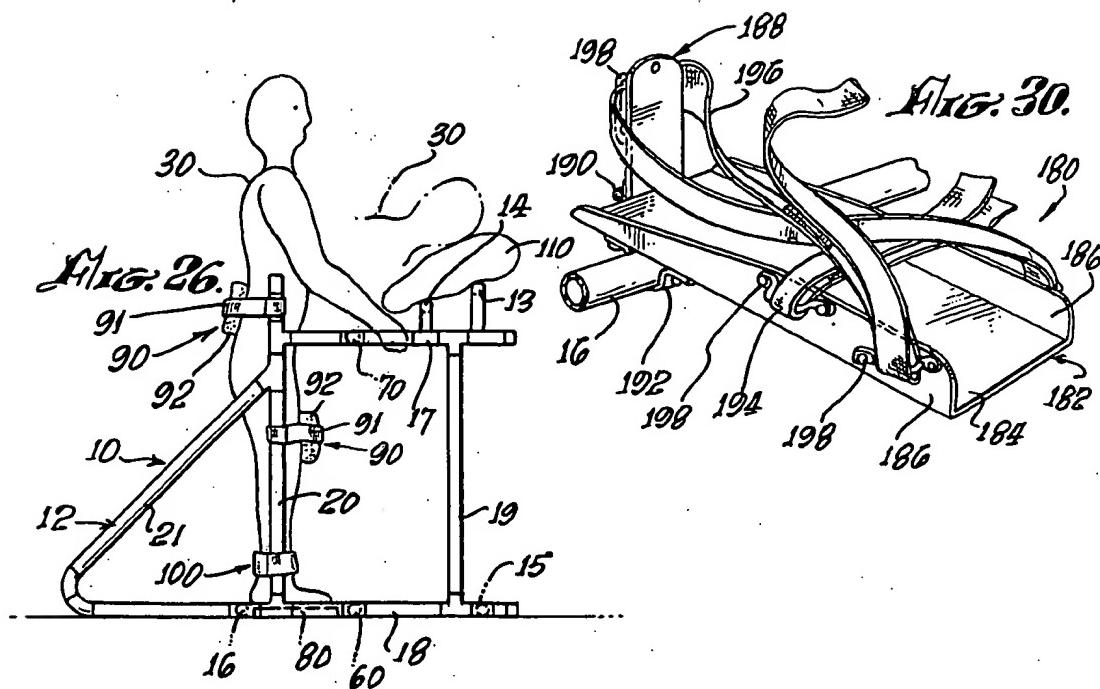












UNIVERSAL SELF HELP AID APPARATUS FOR INVALIDS

CROSS REFERENCE TO RELATED PATENT APPLICATIONS

There are no patent applications filed by me related to this application.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is in the general field of aids for persons suffering from loss of certain body functions, particularly the loss of use of the legs and other portions of the body. The apparatus is further and more particularly in the field of a universal self help aid in which such a crippled or invalid person may stand, walk and exercise in order to rehabilitate himself without an attendant. The apparatus is further in the field of such a device as mentioned wherein it is totally stable to prevent falling when in use and at the same time is so light in weight as to be usable with virtually no muscle effort.

2. Description of the Prior Art

There are many devices for use by invalid or crippled persons. Such devices include exercise bars, ropes over pulleys and with handles, frames in which a person may walk and attempt to support himself, and specially constructed exercise boards, and the like. Each of such devices as previously existed helps to perform a function, but none of the devices permit a patient to approach the device in a wheel chair, assist himself into the device without danger of falling, exercise within the device and stretch and move various muscles, and ultimately allow the individual to walk, carrying the apparatus with him. Each of the prior devices, also, requires an attendant or assistant in the approach to or use of the apparatus. The present invention does not require assistance except in very unusual problem cases.

In being a universal self help aid utilized for all purposes of training and rehabilitating an invalid, there is no prior art approaching the combination of functions of this single apparatus.

Prior devices as described heretofore have not been able to be used with equal effectiveness in both the clinic or the home without special modification.

SUMMARY OF THE INVENTION

There are many persons who have become total cripples by reason of accident or otherwise wherein they are virtually unable to move any portions of their body, particularly the lower limbs. All of such persons are either bedridden or require a great deal of assistance in attempting to move their limbs and in attempting to restore some functioning to their bodies.

I have found that many persons who have been injured and left crippled as a result resent, and actually fight against, assistance from other persons in attempting to exercise. Yet, there has been no apparatus heretofore available by which such persons can safely attempt to exercise and become mobile by themselves.

Likewise, many such persons who are immobile due to injury or the like, wish to exercise and attempt to become mobile at a rate and duration of time which is not feasible due to the normal necessity of an assistant or aid of some sort in utilizing those exercise devices and the like, which are available.

I have studied this problem and have discovered there are certain brace positions for portions of the

body which, if properly utilized, allow one who is otherwise unable to stand or exercise by himself to do so.

I have also found that many exercise devices are so cumbersome and heavy that they cannot be utilized and moved about by a person who has lost the use of his limbs.

Another problem which I have found is that many exercise devices are so unstable that the user is in danger of falling.

Still another problem is that such invalid persons as need exercise help as described are usually confined to wheel chairs and the exercise devices are available are not adapted to direct use by the individual without assistance from the wheel chair. Still another problem is that such invalided person whose injury is so severe that he cannot obtain a standing position himself, requires the assistance of as many as two attendants to reach such a position.

In approaching a solution to this problem, I have finally constructed a universal self help aid comprising a framework which can be approached by and departed from by a wheel chair without the necessity of assistance from another person. The framework is designed to allow the person to enter within the framework and to position his legs and other portions of the body in such manner with bracing elements as to be able to stand and exercise, manipulate, and stretch unused muscles with safety.

The device is further constructed so as to allow one person, even of less than average strength, to bring a completely disabled person to a standing position.

The device is further constructed so as to allow for freedom of the legs from the bracing elements to an extent which allows walking with the use of the framework when a patient reaches the stage of recovery where such is possible.

The entire framework has been constructed by me of tubular elements such as pipe or the like, with various fittings to join the tubular elements permanently and removably so that the apparatus can be easily transported as desired.

It is an object of this invention to provide a universal self help aid in the form of a frame-like apparatus in which a paraplegic or the like, may personally exercise without assistance.

Another object of this invention is to provide such an apparatus as described wherein the patient may walk utilizing the frame apparatus for support.

Another object of this invention is to provide an apparatus as described wherein the patient may stretch and exercise his muscles.

Another object of this invention is to provide attachments to the legs of the patient which will aid in achievement a more normal walking movement of knee and ankle.

Another object of this invention is to provide such an apparatus as is described which is light enough so that a person with very little strength may pick it up and move it while utilizing it.

Another object of this invention is to provide such an apparatus as has been described wherein the patient may exercise without danger of falling and injuring himself.

An extremely and important further object of this invention is to provide relief from muscle spasm which is customarily a problem with badly crippled individu-

als by reason of the ability to stretch the muscles within the device of this invention.

The foregoing and other objects and advantages of this invention will become clear to those skilled in the art upon reading the description of a preferred embodiment which follows, in conjunction with a review of the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a preferred embodiment of the self aid device of this invention as viewed from the top, right, and rear;

FIG. 2 is a left side elevation of the device of FIG. 1;

FIG. 3 is a front elevational view of the device of FIG. 1;

FIG. 4 is a right side elevation of the device of FIG. 1 showing a patient in a wheel chair approaching the open front end of the device;

FIG. 5 is a view similar to FIG. 4 showing the patient standing in an upright position in the device;

FIG. 6 is a view similar to FIG. 5 showing the patient lifting the device from an initial phantom line position to an intermediate dotted position and finally to a solid line position practicing the "walk" mode of use;

FIG. 7 is a perspective view showing various components used in constructing the embodiment of the invention shown;

FIG. 8 is a perspective view of a harness arrangement for use in conjunction with the device shown in FIG. 1;

FIG. 9 is a perspective view showing a modification of the device of FIG. 8;

FIG. 10 is a perspective view of a modified version of the device of FIG. 1;

FIG. 11 is an enlarged sectional view taken on 11—11 of FIG. 10;

FIG. 12 is a fragmentary elevational view partly in section of a modified version of a portion of the apparatus of FIG. 10;

FIG. 13 is a fragmentary elevational view partly in section similar to FIG. 12 showing a modification;

FIGS. 14-22 are schematic views on a reduced scale of the apparatus of FIG. 10 showing numerous positions of a patient using the device as an exercising unit;

FIG. 23 is a perspective of the apparatus modified;

FIG. 24 is a perspective of a strap member used in the device of FIG. 23;

FIG. 25 is a sectional view taken on 25—25 of FIG. 23;

FIG. 26 is a side elevation showing a patient utilizing the apparatus of FIG. 23;

FIG. 27 is an elevation of the device of FIG. 23 with a patient utilizing an alternate attachment;

FIG. 28 is a perspective view of the winch attachment utilized in FIG. 27;

FIG. 29 is an alternate method of adding additional crossbars wherever needed on the apparatus of the foregoing figures; and

FIG. 30 is a perspective of a further attachment that can be utilized with the exercising unit.

DESCRIPTION OF A PREFERRED EMBODIMENT

FIGS. 1 through 6 illustrate a preferred embodiment of a self aid apparatus, generally 10. The apparatus is formed of tubular members and fittings of the like, of a nature to insure good handgripping, lightness and strength while in use. The apparatus 10 is generally provided with right side assembly 11 and left side as-

sembly 12. Crossbars 13 and 14 at the lower front connect these assemblies together and crossbars 15 and 16 complete the rectangular frame structure.

Crossbar members 13, 14 and 15 are constructed in an offset manner and are snugly mounted in frame assemblies 11 and 12 for rotation within their end fittings for purposes which will be described later in this application.

The apparatus 10 is provided with vertical front and rear posts 17 and 18, common to both right and left assemblies, horizontal lower and upper tubular members 19 and 20, and an angular tubular member 21 which connects at its upper end in a curve to vertical post 18.

FIG. 7 illustrates various tubular members and fittings used to assemble the apparatus of FIG. 1. All of these components may be of any suitable material. I have had excellent results with Schedule 40 A-B-S plastic material cemented together by A-B-S plastic cement where rotational movement is not desired. For example, the following items may be used: 1½" diameter pipe 22, tee 23, 90° elbow 24, cap 25, 45° street elbow 26, and 45° tee 27 are representative of elements to be used. As shown in FIG. 4, a patient 30 approaches the apparatus 10 in a wheel chair 40, places his feet over the lower crossbars 13 and 14, and with the aid of his limbs lifts himself to a "standing" position indicated in FIG. 5. This is designated the "stand" mode use of the apparatus.

Having attained this position, the patient may then move forward to the rear of the space within the self aid apparatus 10 as indicated in FIG. 6 and from an original phantom line rest position of the apparatus as indicated by the referenced numeral 10' he lifts the device to the position indicated by 10" and throws the apparatus to a new rest position as shown in solid lines.

This movement enables the patient to progress forward at a pace suiting his ability. It is noted that the cross bars 13, 14 and 15 do not interfere with his feet during this "walk" mode because of being offset rearwardly and forwardly from the posts 17 and 18.

FIG. 8 shows a "walk" mode attachment 50, which helps a patient with very weak muscles in his legs and feet and who would even have difficulty in lifting one or both feet off the ground to propel himself into a forward direction.

The attachment 50 is made up of a harness 51 which is placed about the shoulders of a patient. Straps 52, provided with pads 53 are brought together at connection points 54 and provide anchor points for bungee cords 55. A solid shoe assembly 56, commonly used in therapeutic treatments is then suspended from the cords 55.

In the modification 50' of FIG. 9, the cords 55 are brought down to attachment points 54' of slipper 57 to aid a walking patient. Additionally, a pad 58 may be inserted into the open end of a removable cast and retained by velcro band units 59 or the like, to further stiffen an otherwise flabby leg problem and help a patient to use the self aid apparatus in a "walk mode".

FIG. 10 illustrates a modification to the FIG. 1 apparatus wherein a crossbar 60 is added to the apparatus and a stabilizing board assembly 62 is employed to make the invention ready for an "exercise" mode.

FIG. 11 illustrates the stabilizing board assembly 62 in cross section having strap assemblies 63 which keep the board in place by tying it to horizontal cross members 19.

FIGS. 12 and 13 illustrate two manners in which the crossbar 60 can be placed into position on the apparatus 10. A tubular member 64 may be inserted into a tee 23a having an internally threaded end 64a which receives another externally threaded tubular member 65. As the member 65 is rotated it can move into tee 23b and fully extend the tubular member 60 for use by a patient. FIG. 13 shows a modification of member 60 which is designated 60a. In this form, tube 64a is not threaded, but moves within a second tube 65a having a tapered and split end 65b. A locking sleeve 66 then can be slipped over the junction and a chuck-like grip completes the formation of the additional bar 60a.

FIGS. 14 through 22 illustrate various exercises that can be performed by a patient. FIG. 14 shows a patient 30 approaching the apparatus 10 in a wheel chair 40. In FIG. 15, the patient has assumed a standing position with his body weight on the stabilizing board 62. In this position the ankles can be stretched.

The weight of the patient on the board anchors the apparatus 10 from movement during exercise procedures. In order to exercise the lower back and to strengthen hip and knees, the patient in FIG. 16 has lowered his body to his knees and in FIG. 17 is moving up and down as indicated in phantom lines in a manner that stretches calf muscles. By arching his back, the patient can stretch the abdomen.

In FIG. 18 the sitting position exercises lower back and abdomen muscles and FIG. 19 illustrates sit-up exercises. The added crossbar 60 is utilized in this exercise. In FIG. 20 the patient is using the self aid device for chin ups and FIG. 21 for body lifts. Finally, FIG. 22 shows the patient coming from a sitting position back up to a standing position.

It has been found that in all of the "stand", "walk" and "exercise" modes of this invention it obviously is very easy to reverse the procedure to get back into a wheel chair.

FIG. 23 illustrates a further mode of the present invention wherein the assembly 10 has been tilted and placed with its back side on the floor. The extension of the post 18 gives added stability to the apparatus. An additional crossbar 70 (similar to crossbar 60), a smaller stabilizing board 80, and a series of strap assemblies 90 and 100 have been added to the apparatus. As seen in FIGS. 24 and 25, the stabilizing board 80 is fastened to crossbars 16 and 60 by means of strap assemblies 81. FIGS. 23 and 24 illustrate strap assemblies 90 comprising bands 91 fastened to pads 92 wherein said bands form loops 93, tightened by buckle 94. These strap assemblies are shown in FIG. 23 to be mounted at the top and intermediate positions between cross members 20. At the very bottom of the posts 20 is placed a strap assembly 100 which will later be shown to encircle the ankles of the patient. In the position in which the apparatus rests on the floor as viewed in FIG. 23, the lower crossbar 15 is rotated to the indicated position in order to allow the posts 18 to be flat on the floor.

The added crossbar 70 which in essence is identical to the previously described crossbar 60 is placed between tubular members 17 at an intermediate location. As shown in FIG. 26, a patient has entered the confines of the "stall bar" mode of the self aid device 10. This is accomplished by first standing upright and placing the ankles within the strap assembly 100, and, secondly pushing forward against the intermediate strap assembly 90 which has been mounted in position and finally slipping the topmost strap assembly 90 over the exten-

sion stubs of tubular members 20. Now the patient can stand by himself in this position and do mild exercises. In addition a pillow 110 can be placed on the crossbars 13 and 14. Thus the patient can bend forward and not be without support in the position shown in phantom lines of FIG. 26.

For patients who need more help to attain an upright stature, a winch device designated generally as 120 in FIGS. 27 and 28 is provided to add onto the apparatus 10. Straps 121 affix a winch shaft 122 to the tubular members 19 and posts 17. A flat band 123 made of canvas or other woven material is fastened to the shaft in any conventional manner and has loop extensions 124 at the free end (as shown in FIG. 28). These loops can be put around upper leg portions of the patient and by rotating crank arm 125 of the winch shaft, the patient can be aided to a position indicated in FIG. 27. Also ratchet 126 and ratchet pawl 127 can be mounted onto shaft 122 and tubular member 19 in a manner known in the art to prevent the band 123 and the patient from falling back until said ratchet and pawl are manually reversed to effect such a release.

During the use of the self aid device in FIGS. 26 and 27 conditions, the patient stands on the stabilizing board 80 in order to keep the apparatus 10 firmly on the ground. The added crossbar 70 in the "stall bar" mode provides a support for the winch band 123 at its rearward end and also a bridge for the body of the patient to rest upon. Crossbars 13 and 14 can be brought together as viewed in FIG. 27 to present a sturdy crossbar for the flat band 123. In addition, a pillow 110 can be placed on the band 123 for the patient's comfort.

In FIG. 29, I have shown an additional method of adding crossbars to the apparatus 10 wherever needed. The reference character 170 shows generally the bar assembly comprising bar member 171 with clamping members 172 provided with tightening means such as bolts 173 at each end. This enables a quickly attachable and detachable means of adding bars to the apparatus.

FIG. 30 illustrates a device which can easily be placed on a foot by the patient himself which will aid in motivating the patient's ankle. This device, indicated generally by the reference numeral 180, has a foot plate 182 comprising a base 184 and sides 186. A hinged heel plate 188 hinged at 190 is rotatably mounted onto the crossbar 16 by means of bracket assembly 192. Velcro fastened strap assemblies 194 and 196 are easily wrapped around a patient's foot and ankle by looping through affixed "U" units 198. The device 180 allows a patient to exercise his ankle while in a "stand" mode.

While the embodiments of this invention shown and described are fully capable of achieving the objects and advantages desired, it is to be understood that such embodiments are for the purposes of illustration only and not for the purposes of limitation.

I claim:

1. Apparatus for assisting a crippled individual in movement and exercise comprising: a frame consisting of two side frame members, wherein said side frame members include angularly disposed members to be gripped by an individual using the device; elongated members joining said two side frame members at one of their ends include members suitable to engage the lower legs of the person using the same in a clamping manner; elongated members joining the other end of said side frame members in such a manner as to allow for entry from that end from a wheelchair.

2. The apparatus of claim 1 wherein a foot brace is removably connected between the members which are suitable to engage the lower legs and said foot brace has attached thereto a harness suitable to be fastened onto the body of the user of the apparatus.

3. Apparatus for assisting a crippled individual in movement and exercise comprising: a frame consisting of two side frame members, wherein said side frame members include angularly disposed members to be gripped by an individual using the device; rotatably mounted elongated members joining two side frame members upon one end thereof, said rotatably mounted elongated members being offset outwardly from the frame in order to allow for movement of said crippled individual within the confines of said frame to exceed the general space provided within said frame; and rotatably mounted elongated members joining the other end of said side frame members in such a manner as to allow for entry from that end from a wheelchair.

4. The apparatus of claim 3 wherein an elongated member joining the side members of said frame at the end opposite the entry end is offset outwardly from said frame to allow movement of said crippled individual within the confines of said frame to exceed the general space provided within said frame.

5. The apparatus of claim 4 wherein an anchoring plate means is affixed to said frame by fastening means when said frame is rotated 90° from its initial position which assisted an individual in movement and standing to a position to assist said individual to exercise upon said anchoring plate means and by assisting himself on said frame means and elongated connecting members.

6. The apparatus of claim 4 wherein said two side frames, said elongated members and said angularly disposed members to be gripped by said individual are made from 1½ diameter tubing and from a Schedule 40 A-B-S plastic material cemented together by A-B-S plastic cement where rotational movement is not desired.

7. The apparatus of claim 5 wherein a lift mechanism is attached to said frame and said lift mechanism has a harness means for supporting said individual in an upright position when said individual is a paraplegic or a quadriplegic.

8. The apparatus of claim 7 wherein said lift mechanism is a winch mechanism and said harness means includes a conveyor belt means which is supported on said elongated members and said conveyor belt means having said harness means for supporting said crippled individual.

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